The Uponor Climate Controller C-46

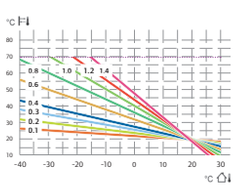
Supply water controller for radiant heating and cooling – easy to install – providing system efficiency

Climate Controller C-46 – convincing with advantages

Easy installing & smooth running

Supply water temperature control:

- Heating
- Cooling
- Heating & cooling
- Snow & ice melting



Weather compensator:

- Adjusting heat curve
- Wireless outdoor sensor
- Automatic summertime-/ wintertime change
- Optimal comfort
- Energy efficiency

Pump management:

- With internal fuse
- By zone
- Saves energy
- Pump exercise

Dew point control:

- Up to six wireless humidity sensors
- Avoiding condensation
- Flexibility regarding the placement

Matches perfectly with Uponor Control System DEM C-56:

- C-56 thermostat can be shared
- Compensation of supply water temperature based on both indoor and outdoor temperatures
- H/C-state and ECOmode can be shared

Easy to install & handle:

- Professional installation mode: Wizard
- Quick Menu for Customers
- Basic Main Menu

This is where safe and efficient heating and cooling starts

Put the Climate Controller C-46 in charge – and the whole heating and cooling set-up will run smoothly

The Uponor Climate Controller C-46 is a supply water controller for heating, cooling and snow and ice melting systems, applicable to Uponor radiant heating and cooling systems. Its main function is to regulate supply water temperature by controlling a mixing valve actuator in a very intelligent way. Its main achievement is perfect comfort.

Room control:

The Uponor Control System DEM allows perfect individual comfort – without the need of manual balancing.

Up to six sensors give feedback on the humidity indoors thus avoiding condensation. Thanks to the wireless connection the sensors' placement is completely flexible.

Supply control:

The weather compensating Uponor Climate Controller C-46 regulates the supply water temperature for both heating and cooling.

Heart of the system – the C-46

Product Facts

1047844 UPONOR Climate Controller C-46

In the basic version the weather compensator controls supply water in heating. It can be integrated in the C-56 room control via bus connection.

Consisting of:
Climate Controller C-46 | Wired Outdoor sensor | Wired Supply sensor

Options:
Antenna Module for connection to wireless Thermostats | Wired Indoor sensor | Wired Return sensor

Accessories:
Outdoor sensor (5m cable) | Supply sensor (4m cable) | mounting material

1047845 UPONOR Climate Controller C-46 extended

In the extended version the weather compensator controls supply water in heating and cooling mode. It can be integrated in the C-56 room control via bus connection.

Consisting of:
Climate Controller C-46 | Antenna | Wireless Humidity Sensor H-56 | Wired Outdoor sensor | Wired Supply sensor

Options:
Wired Indoor sensor | Wired Return sensor | Additional 5 Relative Humidity sensors

Accessories:
Outdoor sensor (5m cable) | Supply sensor (4m cable) | mounting material | 3m Antenna cable

Humidity Sensor H-56/Antenna:
Wireless Relative Humidity sensor with battery alarm, incl. batteries and mounting kit; connects to C-46 with antenna or via C-56

General

· Installation Wizard makes installation & set-up fast and easy · Quick Menu system gives easy access to basic settings · Integration with C-56 room control via bus gives CC access to zone data from C-56 · System information (H/C-state, ECO-mode etc. are also shared on the bus) · Automatic summer/wintertime change · ECO/Comfort timer in CC if no I-76 in the system · Clock backup 8 hours · Alarm at disturbance · Pump management with internal fuse · Supports 24V Thermal Actuator/or 0-10V controlled rotating mixer motor (power supply 24V needed)/or variable speed pump · General purpose input for Heating+Cooling switch/or Snow and Ice detection · General purpose output for Heating+Cooling command/or Dehumidification command/or Error signalling · Input Indoor sensor · Input Outdoor sensor · Input Supply sensor · Input Return sensor ·

Manual
1 printed multi-lingual pictured "QuickManual" | 1 CD "Climate Controller"
With: English, German, Dutch, French, Italian, Portuguese, Spanish, Swedish, Norwegian, Danish, Finish

Modular design principle – right for every site

Accessories and extensions for any need

The Uponor C-46 is available with complemantary equipment – to make the most of any application.

1047846 UPONOR Humidity Sensor H-56
This wireless RH sensor with battery alarm comes with batteries and mounting kit. Up to six of these sensors can be connected to C-46 with antenna or via C-56.

1000513 UPONOR Antenna (white)
1046116 UPONOR Antenna (gray)
Antenna wired to the C-46 to connect the H-56.
Available in two colors

1047847 UPONOR Supply or Return Sensor for C-46
It can be connected directly to Climate Controller C-46 and comes with a 4 m wire. For an average temperature control only the Return sensor is needed.

1047848 UPONOR Outdoor or Indoor Sensor
It can be connected directly to Climate Controller C-46. An additional connection wire is needed.

1048763 UPONOR Wall Power Supply 230V/24V; 0,30A; (N/CE/S)
It can be used for 0-10V controlled mixer motors and comes with an Euro-plug.

1002356 UPONOR Mixer Motor 24V with 0-10V signal
It comes with a 24V actuator, its signal ranges form 1-10V.

C-46 works as stand-alone or team player

System integration with C-56 Radio enhances capabilities

The Uponor Climate Controller C-46 is a smart device by itself. It works as stand-alone or integrated in pump and shunt groups. Either way, its value is multiplied in combination with the Uponor Control System DEM. The Climate Controller C-46 can be integrated in the C-56 room control via bus connection

The dialogue between those two Uponor devices increases the performance significantly, using thermostats, sensors and timer functions commonly. Also, the H/C-state, the ECO-mode and other settings are shared between the Uponor Climate Controller C-46 and Uponor Control System DEM.

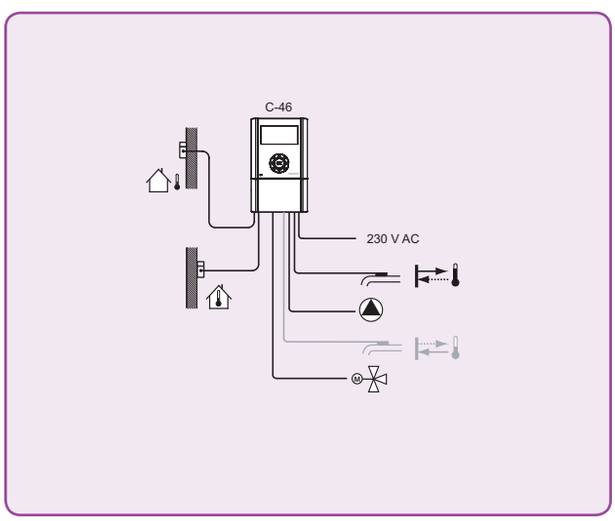
If you think about installing heating and cooling in single family houses or small-sized office buildings, think about an integrated Uponor system for maximum efficiency, reliable supply and an easy work process on the site.

Efficient dialogue between Uponor Climate Controller C-46 and Uponor Control System DEM save time and money both in installation and operation.

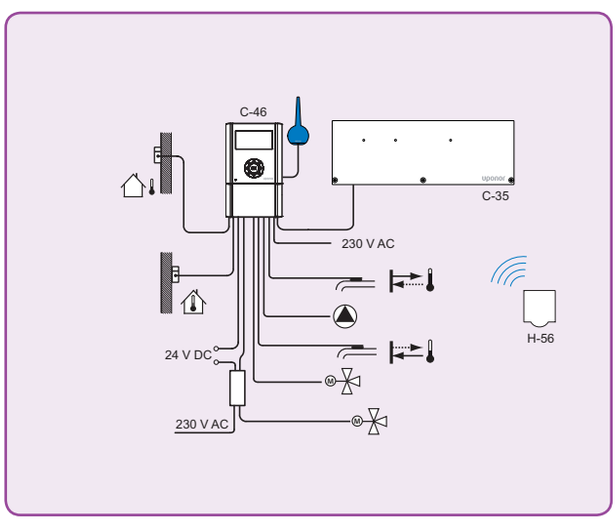
The Climate Controller C-46 can be integrated in the C-56 room control via bus connection, all to increase the efficiency and connectivity of the indoor climate system. This means that the Climate Controller uses the feedback it gets from all points connected in the zone control system, sensors and thermostats. This function is unique in its class. The Climate Controller C-46 is performing at its best working together with Uponor Control System DEM. Here are some of the possible configurations:

- These systems offer a true pump management per zone. When a circulation pump is connected to the Climate Controller C-46, the pump management decisions can be made by the Controller C-56 Radio. This means that the pump will be stopped when there is no heating or cooling demand.
- One or more Relative Humidity sensors H-56 can be connected through Controller C-56 Radio to use the average or maximum relative humidity in a zone, all to provide as exact control as possible.
- Uses Controller C-56 room thermostats to calculate the average temperature or the greatest deviation from the setpoint temperature in a zone. No separate indoor sensor is needed for the Climate Controller C-46, although there is the possibility to have one.
- Climate Controller C-46 supports both wireless and wired outdoor temperature sensor.
- Wireless outdoor temperature sensor can be connected through Controller C-56 or directly to the Climate Controller C-46.
- Economy and comfort mode timer: Stand-alone in Climate Controller C-46 or integrated with Interface I-76 through Controller C-56 Radio.
- Holiday mode can be controlled by the timer function in Interface I-76 through Controller C-56 Radio.
- Heating/cooling status is shared between the two systems, meaning, manually handling of this setting at one device only.

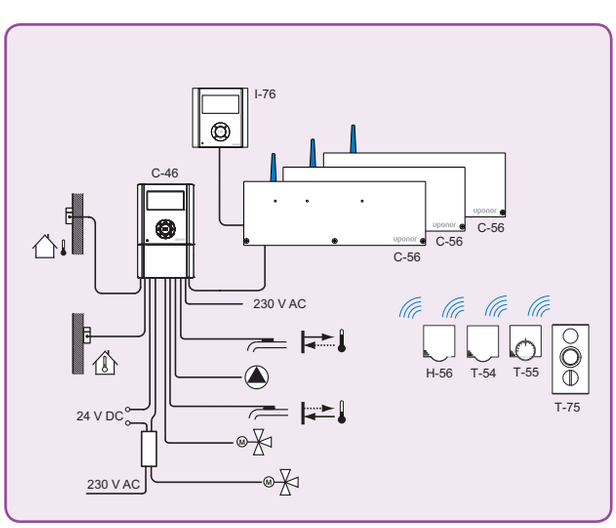
C-46 works as stand-alone or team player



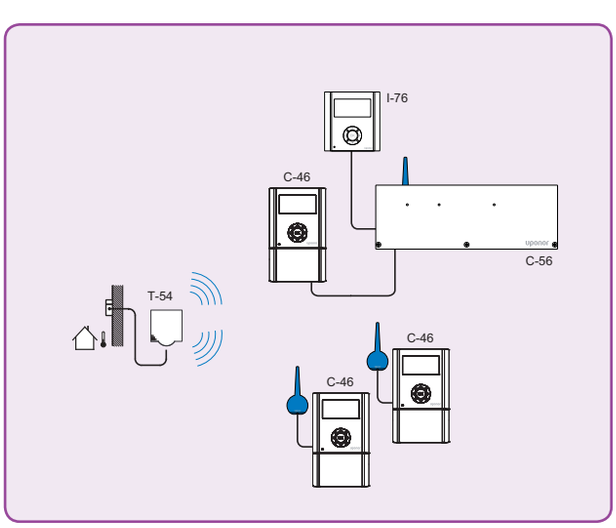
Climate Controller C-46 as stand-alone – with Uponor wired indoor/ outdoor sensors as typical Supply Water Control combinable with all kinds of heatsources.



Weather compensating supply water control C-46 for Heating & Cooling in combination with the Uponor wired system C-35 using the H/C switchover

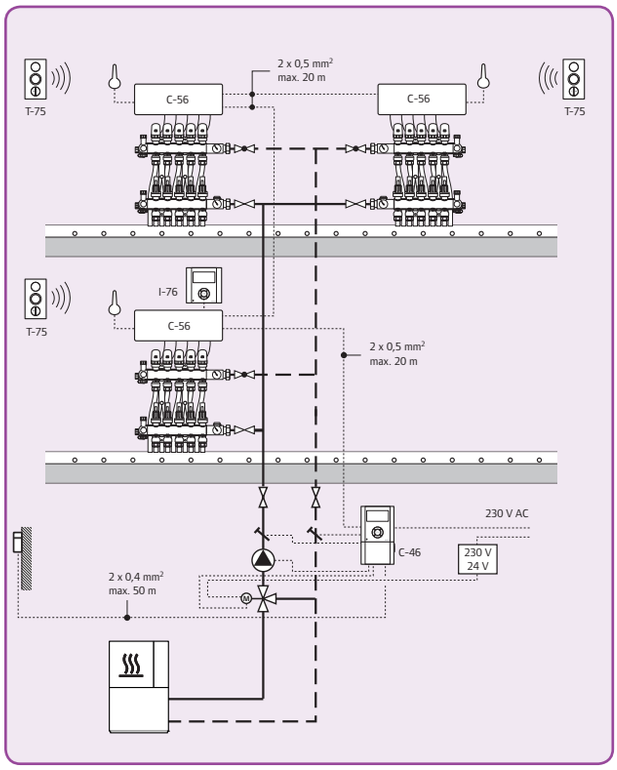


Weather compensating supply water control C-46 in an integrated, intelligent cooperation with C-56 (max.3) for efficient heating and cooling.

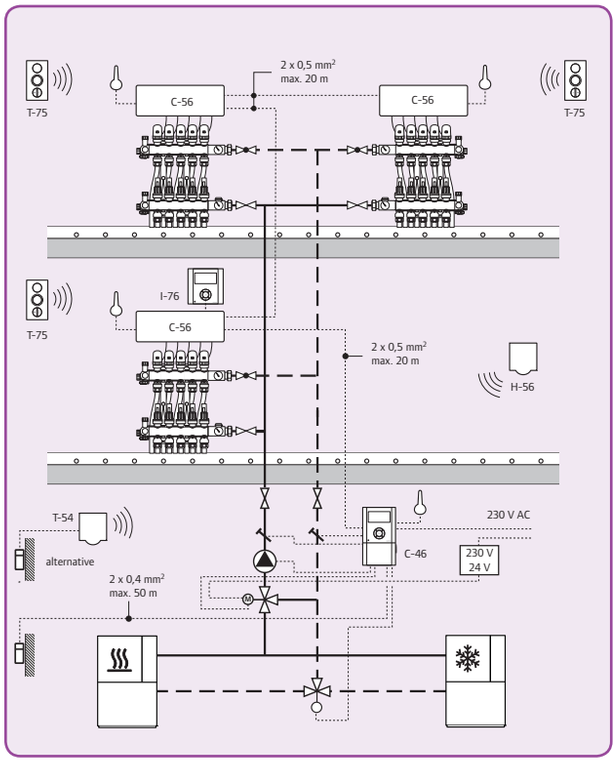


Outdoor sensor flexibility:
Outdoor sensor via T-54 in combination with C-46. If several C-46 units are used, only one outdoor sensor T-54 combination is needed. This outdoor temperature information is also shared via C-56. The I-76 is showing then the outdoor temperature in first screen.

Radiant heating/cooling system examples:

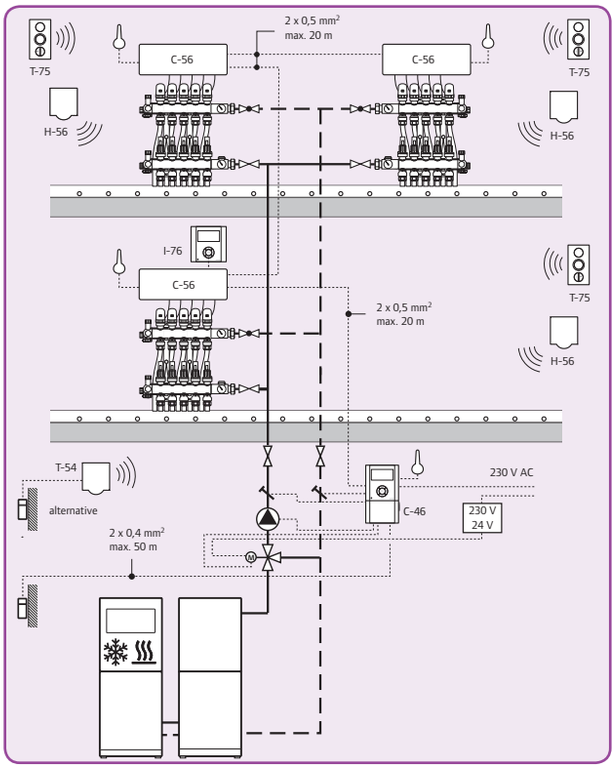


Underfloor heating in residential and office buildings powered by a boiler

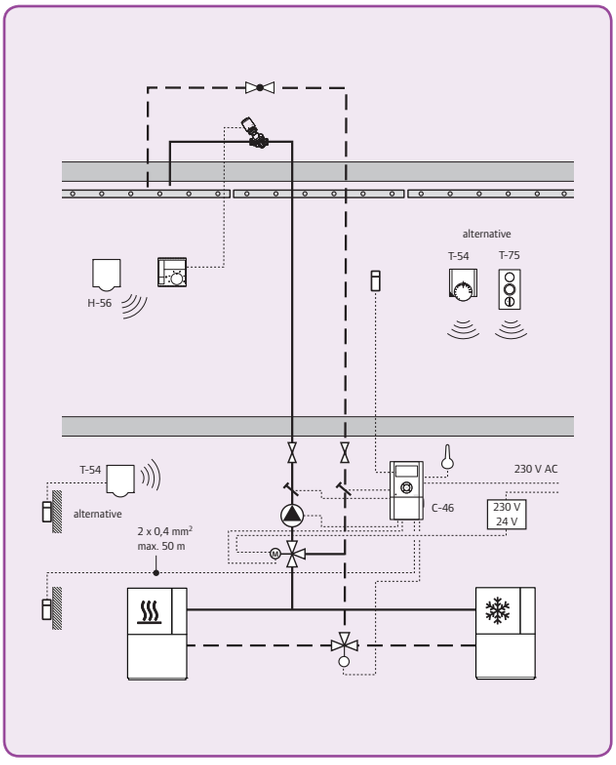


Underfloor heating and cooling in residential and office buildings powered by a boiler and a chiller

Radiant heating/cooling system examples:

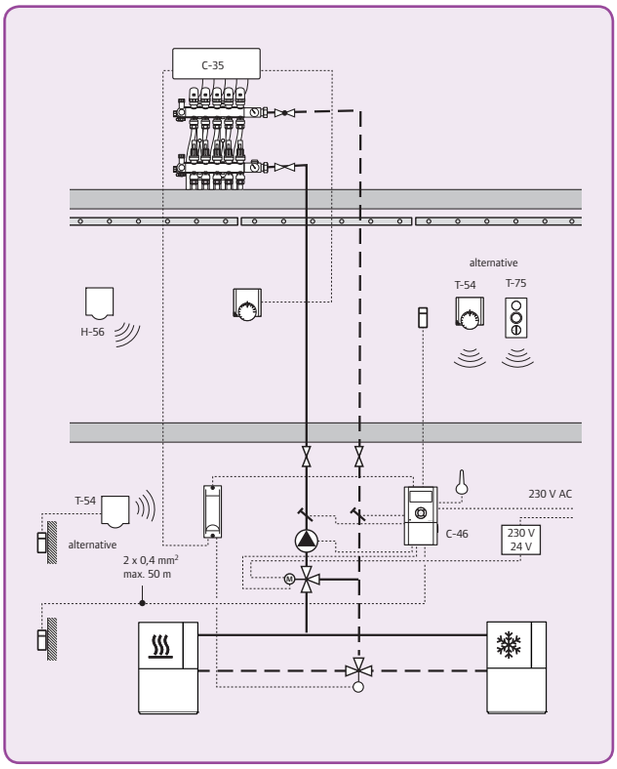


Underfloor heating and cooling in residential and office buildings powered by a air to water or ground source heat pump

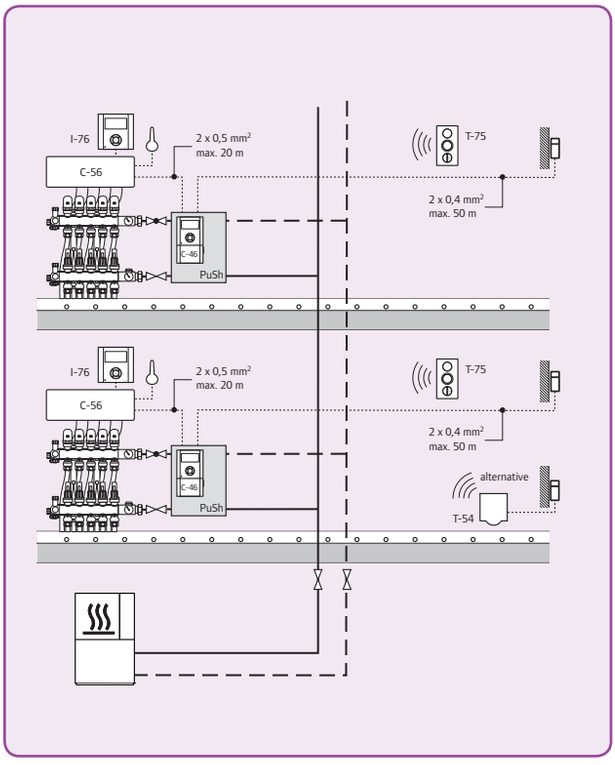


Ceiling heating and cooling in residential and office buildings using four ways manifold; or tichelmann distribution powered by a chiller and a boiler

Radiant heating/cooling system examples:

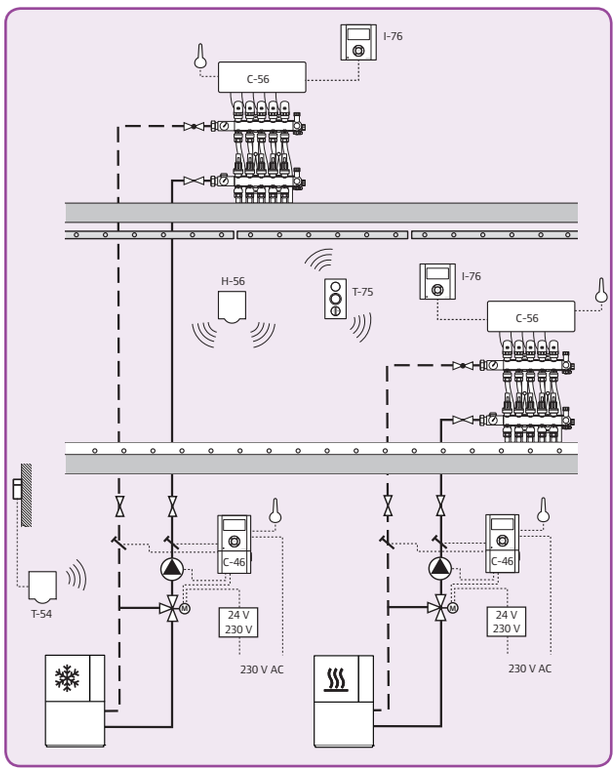


Ceiling heating and cooling in residential and office buildings using manifold distribution powered by a chiller and a boiler

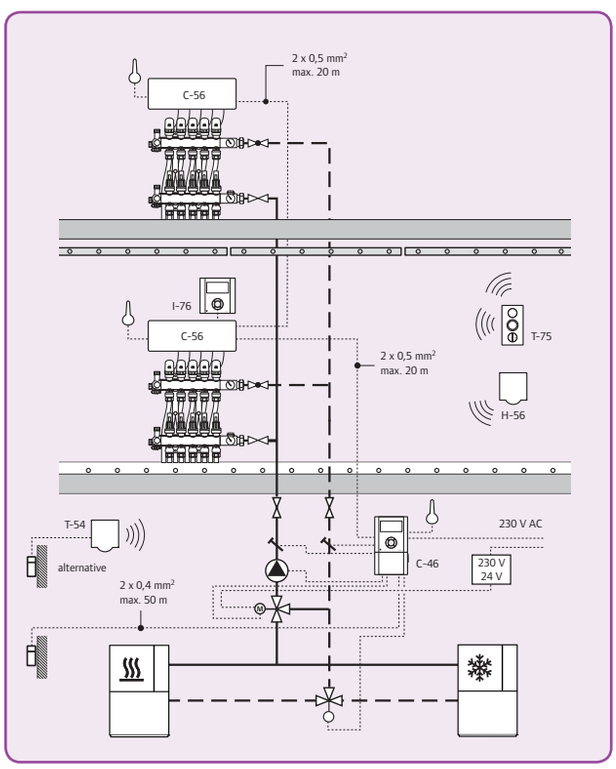


Central heating distribution for multiple zones with different heat demands; each Climate Controller C-46 manages independently the supply temperatures with an Uponor Pump & Shunt group.

Radiant heating/cooling system examples:

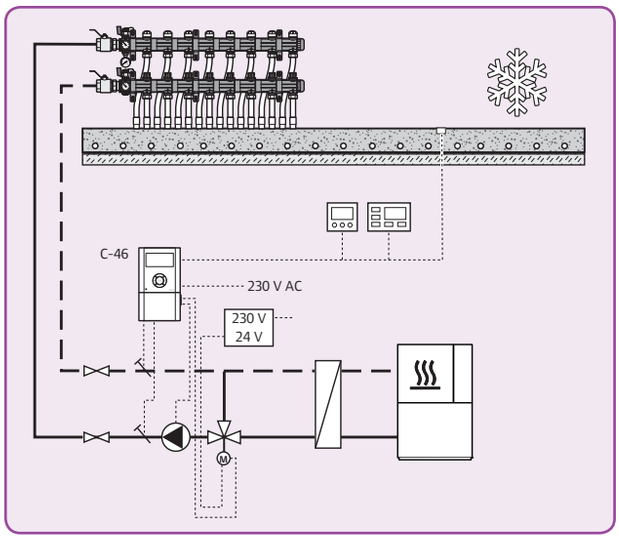


Underfloor heating powered by a boiler and ceiling cooling powered by a chiller in residential and office buildings



Underfloor heating and cooling and ceiling heating and cooling in residential and office buildings, powered by a boiler and a chiller

Radiant heating/cooling system examples:



Snow & Ice melting

Your Application:
Scribble how you could apply the C-46 on your site!

Three basic modes of operation,various diversifications

The table below shows which sensors are used in which operating mode.

Operating mode	Supply sensor	Outdoor sensor	Indoor sensor	Return sensor	Relative humidity sensor	Floor sensor
Heating – fixed supply	X					
Heating – outdoor controlled supply	X	X				O
Heating – outdoor controlled supply with indoor compensation	X	X	X			
Heating – outdoor controlled average	X	X		X		
Heating – indoor controlled	X		X			
Cooling – fixed supply	X					O
Cooling – indoor controlled	X		X			O
Cooling – indoor compensated supply with dew point control	X		X	X	X	O
Snow and ice melting	X			X		

X = the sensor must be used in this operating mode
O = the sensor is optional

Heating modes

Depending on the sensors used, the following heating modes are available:

- Heating – fixed supply
- Heating – outdoor controlled supply
- Heating – outdoor controlled supply with indoor compensation
- Heating – indoor contolled
- Heating – outdoor controlled average

Cooling modes

Depending on the sensors, the following cooling modes are available:

- Cooling – fixed supply
- Cooling – indoor controlled
- Cooling – indoor compensated supply with dew point control

Up to six humidity sensors help to avoid condensation reliably. The wireless connection allows free placement of the sensors. Great to respond changes in usage or architecture at any time!

Clever combination of heating and cooling modes

The following switchover modes are available:

- H/C Switchover – indoor-outdoor temperature controlled (temperature readings from the indoor and outdoor sensors)
- H/C Switchover – supply temperature controlled (depending on the primary supply water temperature)
- H/C Switchover – manual mode (when the user manually sets it in either mode)
- H/C Switchover – slave mode (controlled from an external source)

Snow and ice melting modes

The figure shows how the Climate Controller C-46 can be set up in a snow and ice melting system. The figure also shows several system components that can be connected to the Climate Controller C-46. Note! Only Uponor sensors and equipment should be used in combination with the Climate Controller C-46.

The following operation modes are available:

- Snow and ice melting – idle setpoint
- Snow and ice melting – melting supply setpoint temperature

Wizard and Quick menu: secure an efficient setup

In terms of setting up and handling the Climate Controller C-46 leaves the competition far behind. In contrast to just one main menu tree it comes with three elaborate interface menus:

Wizard – great installation guide

When the C-46 is started the very first time, it guides the installer to make the necessary primary settings of the system. Wizard helps you step-by-step through the installation process. On the display the installer can read all about the set-up and what to do next. The installation wizard is also started after changing or resetting the operation mode.

Quick menu – gives easy access to basic settings

Made for end-users: The Quick menu consists of a series of screens easily accessible from the Uponor screen. These screens display readings for daily use. If the Climate Controller C-46 is set to installer access level, it is also possible to modify some parameters.

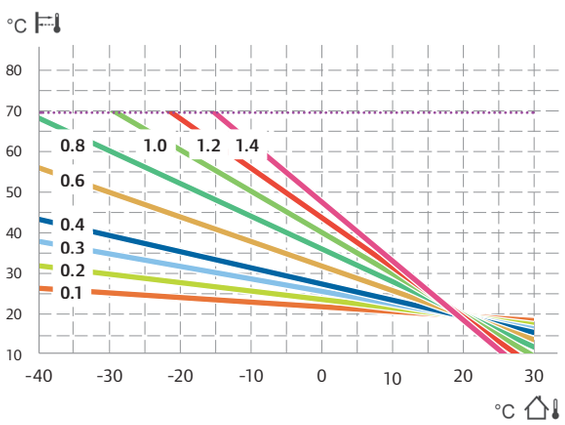
Main menu – all informations and settings on the whole

The main menu and all its sub-menus are used for displaying any accessible information, parameter settings, and selecting operating modes that are accessible in the system.

Efficient temperature setting: less energy, more comfort

Adjusting the heat curve

The two parameters T-slope and T-adjustment are used to adjust the heat curve:



T-slope:
This parameter is used to change the slope of the graph in a supply temperature-outdoor temperature diagram. The curves in the diagram all pass through the point where outdoor and supply temperatures are both 20°C.

T-adjustment:
The T-adjustment parameter is used to move the curves vertically (parallel). If the house is not warm enough at moderate outdoor temperatures, then it is recommended to increase the T-adjustment setting. A supply information menu gives useful feedback when adjusting the heat curve.

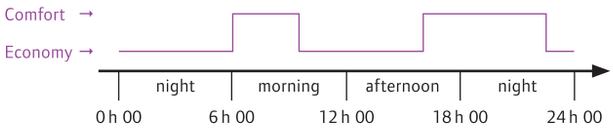
Economy and comfort modes

The economy mode (ECO) is used to save energy. In heating mode, the economy mode reduces room temperatures with a given setback temperature. In cooling mode, the temperature is increased. Different economy profiles may be applied for the days of the week. The default setting in the Climate Controller C-46 is comfort mode (COMF).

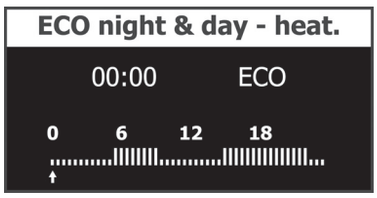
Comfort mode
In comfort mode the system keeps a constant temperature in the room at the setpoint temperature. If an indoor thermostat is connected to the C-46, the indoor setpoint temperature is used. In all other cases the supply setpoint temperature is used.

Economy mode
In economy mode the temperature setpoint is automatically set back for periods of the day when the comfort temperature is not needed, for example during the night or when no one is present in the house.

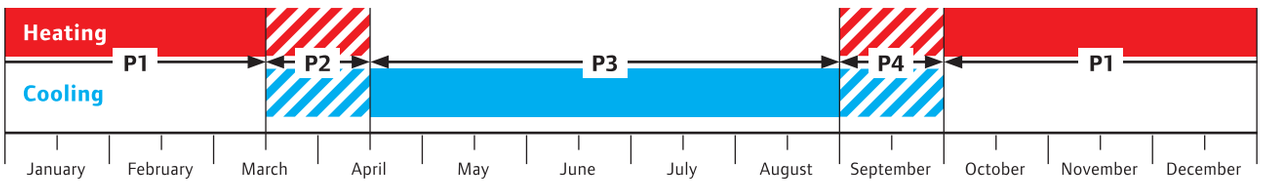
See example:



and as it is shown in the display:



Heating and cooling mode with season shut-offs



The shut-off functions are there to save electrical energy of the pump. During the P1 periods the pump runs continuously.
In P2 periods it is switched off under certain conditions. Logically this has to be different for heating / cooling through the seasons of the year.

Cooling and dew point

Radiant cooling, using either the floor or ceiling as an emitter, will require attention regarding the risk of condensation on the emitter surface. The C-46 have build in functions for cooling applications and also allow dew point control with up to 6 wireless relative humidity sensors. When using radiant cooling it's strongly recommended to use a dew point control in order to prevent from condensation.

Emitter surface and humidity

Design temperatures for cooling systems are specified according to the dew point. The dew point is defined by the room temperature and the relative humidity. The cooling capacity of the system is defined by the difference between the room temperature and mean water temperature.

Often standard design parameters for cooling systems are an indoor temperature of 26°C and a relative humidity of 50%.

At the dew point the emitter surface will start to condensate. In order to avoid condensation the emitter surface has to be over the dew point.

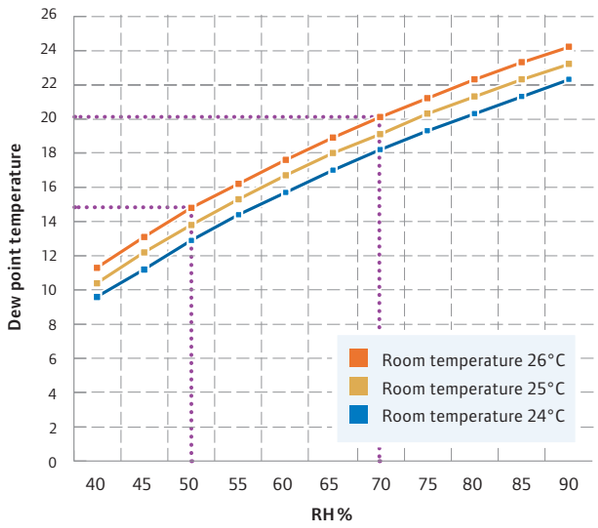
For radiant floor cooling a minimum surface temperature is defined as 20°C which means that only when the relative humidity passes 70 % in the room, the risk of condensation occurs. Because that corresponds to a relative humidity of 100% at the emitter surface.

Radiant cooling from the ceiling is limited by the radiant asymmetry between the surface of the emitter and the room temperature. Recommendation is that it should not exceed more than 14 K. For standard conditions (26°C, 50% RH) the surface of the emitter usually reaches the dew point before the limit.

Distribution pipes and manifolds

In any cooling system where you have distribution pipes or manifold you have to be aware of that these parts of the system also have a risk of condensation because it sometime work below the dew point. Insulation of distribution system is often necessary to avoid condensation.

Dew point



Design temperature

The design supply water temperature of the system depends on the type of emitter used, the design indoor conditions (temperature and relative humidity) and the cooling loads to be removed. It should be calculated to obtain the maximum cooling effect possible from the system.

The capacity and mean water temperature for radiant floor cooling depends on the floor construction, pipe pitch and surface material. To have the highest possible capacity of the system you should design your floor construction so the surface temperature is equal to the minimum temperature of 20°C.

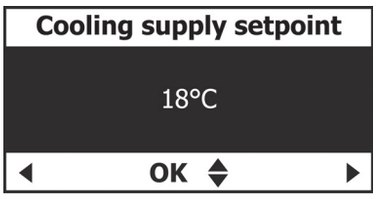
The capacity and mean water temperature for radiant cooling from the ceiling is calculated, or can be read directly, in the capacity diagram of the cooling panels. To have the highest possible capacity of the system you should design as close to the dew point as possible.

Paremeters and settings

Cooling – indoor compensated supply with dew point control

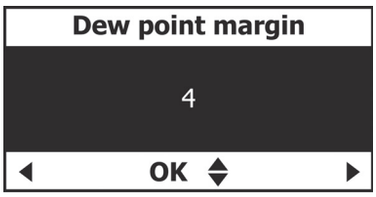
In the operation mode cooling – indoor compensated supply with dew point control, will help you to prevent condensation problems if the actual condition in the room/zone is different from the design criteria.

The supply water set point is referring to the design supply temperature of the system and is the absolute minimum temperature the C-46 will provide the system. The default setting is 18°C and has to be adjusted to the dimensioning design temperature.



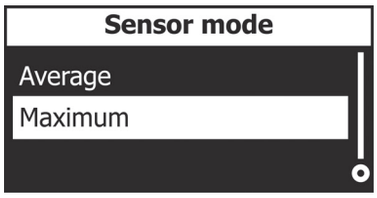
Setpoint range: 5–25 °C

The functions also allow using a dew point margin, as an extra safety to compensate for the variation in room condition, occupation of the room etc. The default setting is 4 kelvin and can be adjusted to the actual need.



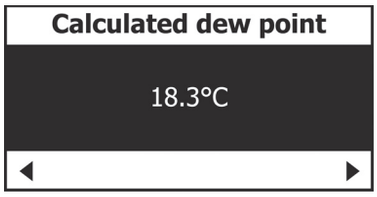
Parameter range: 1–10 kelvin

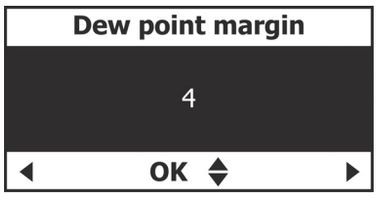
The functions require humidity sensor H-56 and can handle up to 6 sensors, placed in different room/zones. The sensor mode function allows to decide which value have to be used in the dew point calculation, it can be set as an average or maximum value of the sensor. For cooling applications it is always recommended to use the maximum sensor mode.



Resulting supply water temperature

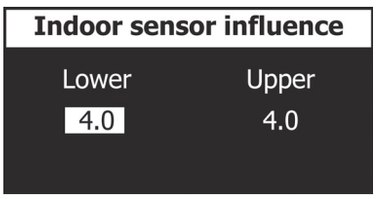
The dew point control is activated if the cooling supply setpoint is below the calculated dew point. The function overrules the cooling supply setpoint and automatically adapts the temperature according to calculated dew point based on the measured room temperature and humidity of the room/zone. The resulting supply water temperature is the calculated dew point + the dew point margin.





Using the Indoor sensor influence

When the C-46 is used without the Controller C-56 controlling single or multiple zones it works as a full flow system in cooling mode. The indoor influence is a supply temperature adjustment that is depending on the difference of the indoor temperature and the indoor set point. This means that the supply will be increased if the indoor temperature is to low and it will be decreased if the indoor temperature is too high. The size of the adjustment is given by the indoor sensor influence parameter.



Setting range: 0–8

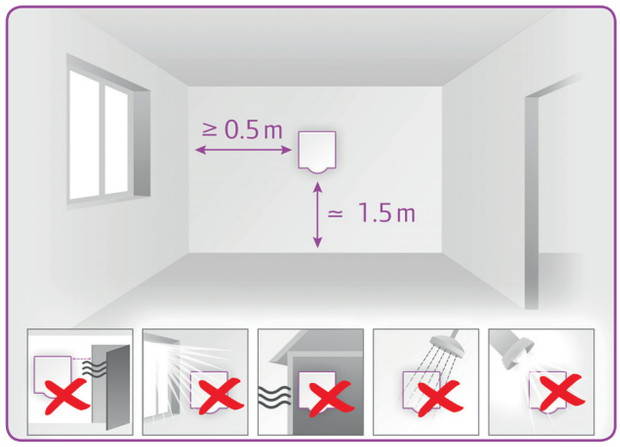
If the lower influence is set to 2 and the room temperature is one degree below setpoint, the supply will be increased by two degrees. If the upper influence is set to 2 and the room temperature is one degree above setpoint, the supply will be decreased by two degrees. The setting will not influence the dew point control if the default setting is 4.

Wireless Humidity Sensor H-56

The C-46 can handle up to 6 humidity sensors H-56. The sensors should be placed in rooms where you expect the highest humidity and cooling is activated.

The humidity in a zone, or room, is different depending on several parameters. Especially sensitive are rooms where people spend most of their time or rooms where there is a lot of people.

The sensor should be placed in a representative spot in the room / zone which is not affected by parameters such as direct sunlight, electronic equipment or fireplaces.



Technical data

Climate Controller C-46	CE marking	
	Measures	Width 106 mm, height 174 mm, total depth 84,5 mm (button depth 4 mm)
	IP	IP30 (IP: degree of inaccessibility to active parts of the product and degree of water)
	Degree of protection	IK04
	Low voltage tests	EN 60730-1* and EN 60730-2-1**
	EMC (electromagnetic compatibility) tests	EN 60730-1 and EN 301-489-3
	ERM tests (electromagnetic compatibility and radio spectrum matters)	EN 300 220-3
	Home and building electronic systems (HBES)	50090-2-2 Part 2-2: System overview - General technical requirements
	Power	230 V AC +10/-15 %, 50 Hz, wires < 1.5 mm²
	Power consumption	19 W maximum
	Operating temperature	0 °C to +55 °C
	Storage temperature	-20 °C to +70 °C
	Maximum ambient RH (relative humidity)	95 % maximum at 20 °C
	Sensor inputs	Four analog inputs for NTC temperature sensors 2 wires, < 1.5 mm², < 4 m
	General purpose input	Only dry contact 2 wires, < 1.5 mm², < 20 m
	General purpose output	Galvanic isolated dry contact 24 V AC, 1 A maximum Minimum switching capacity: 100 mA, 5 V DC, 2 A circuit breaker recommended 2 wires, < 1.5 mm², < 20 m
	Thermal actuator output	24 V DC ±10%, 300 mA maximum, short circuit protected (one valve only) 2 wires, < 1.5 mm², < 0.75 m
	Motorized valve output	0–10 V DC, short circuit protected 2 wires, < 1.5 mm², < 20 m
	Pump output	Galvanic isolated 230 V AC supplied relay contact 2 wires, < 1.5 mm², < 20 m
	Antenna output	For Uponor antenna
	C-56 connection	Possibility to connect to Controller C-56 Radio system
	Fuse	T 5 A, 5×20 mm B, break capacity 1500 A Protects power supply and pump, Spare fuse in fuse holder
	Reset	0.5 s minimum to reset device
	Display	LCD, 128×64 pixels
Antenna	Power supply	11 V DC ±10% from Climate Controller C-46
	Consumption	less than 1 W
	Radio frequency	868.3 MHz
	Transmitter duty cycle	1 %
	Receiver class	2

* EN 60730-1 Automatic electrical controls for household and similar use, Part 1: General requirements

** EN 60730-2-1 Automatic electrical controls for household and similar use, Part 2-1: Particular requirements for electrical controls for electrical household appliances

*** EN 60730-2-9 Automatic electrical controls for household and similar use, Part 2-9: Particular requirements for temperature sensing controls

Usable in all Europe CE 0682

Declaration of conformity:

We hereby declare under our own responsibility that products dealt with by these instructions satisfy all essential demands linked to the R&TTE 1999/5/CE Directive dated March 1999.

It makes sense to install the Uponor Climate Controller C-46.

For safe and efficient heating & cooling, management of the system has to be intelligent and reactive. The C-46 provides continuous control and comfort.

- **It is so easy to install, with the installation wizard as a perfect guide**
  On the display you can read all about the set-up and what to do next – allowing fast and tailormade installation.
- **Quick menu – makes it easy to handle in operation for end-users**
  Now it's easy to find the settings for everyone. Changes can be set up quick and easy – without digging deep into the menu tree.
- **Maximum safety – 6 wireless humidity sensors**
  Up to six wireless dew point sensors avoid any condensation on pipes, floors, walls or ceilings!
- **Goes perfect with DEM for highest efficiency in heating and cooling**
  New dialogue between C-46 and C-56: They use each others thermostats and sensors to save energy and create maximum comfort at the same time.
- **Pump management with internal fuse**
  Management combined, pump will be stopped when there is no demand in the zones.
- **Wireless outdoor sensor**
  Providing a unique flexibility at any stage of the installation.

Without any doubt!

Uponor – partnering with professionals

Uponor is a leading supplier of heating and cooling and tap water systems both for single family houses and office buildings. You will benefit from decades of experience and a profound partnership.

Uponor. Simply more.

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